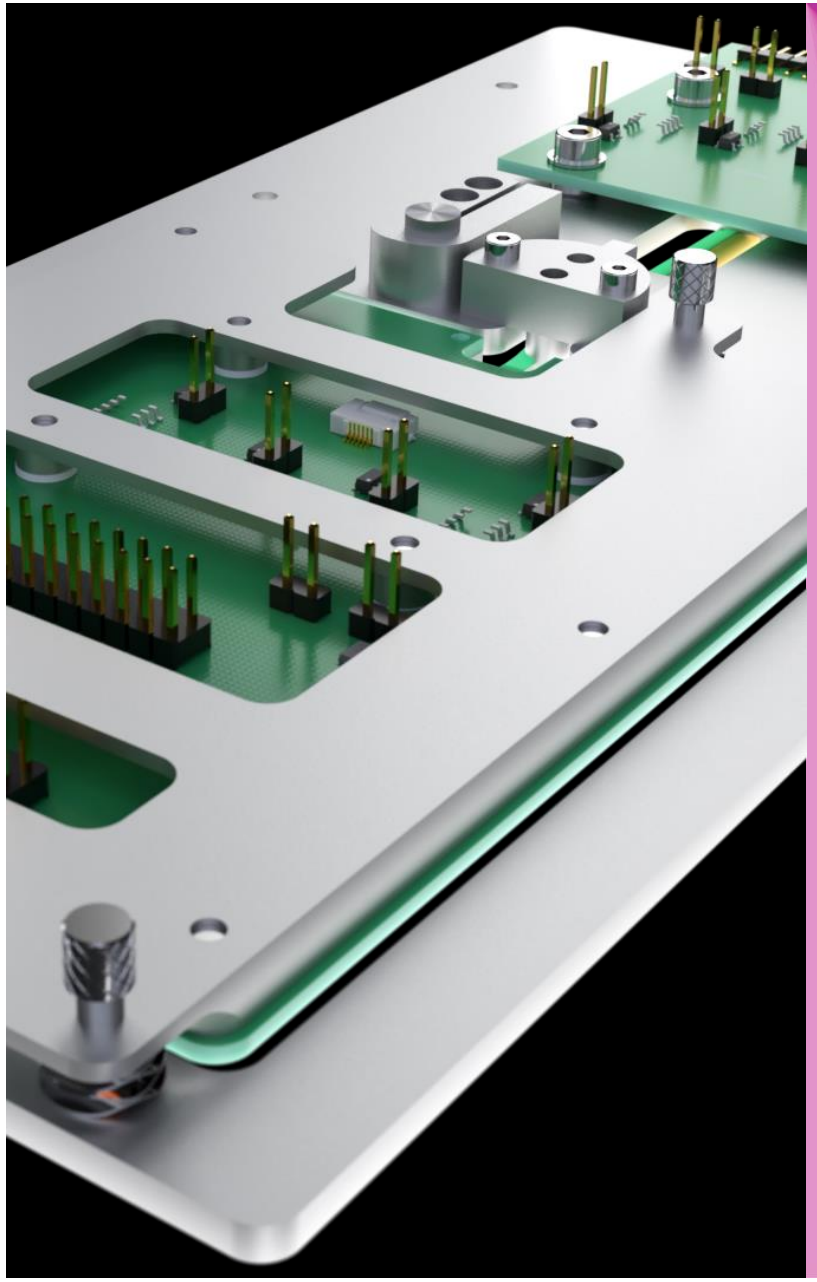

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UFO Probe Card

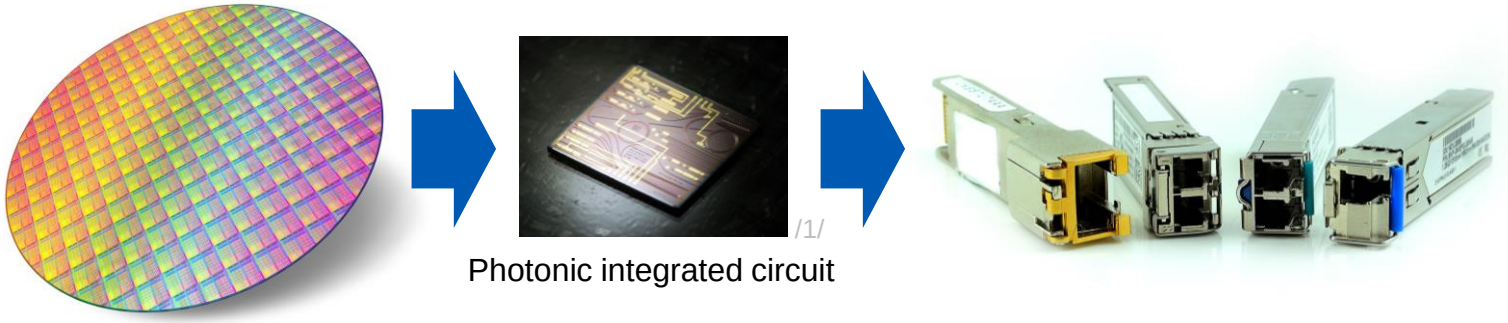
Optical solution for high volume testing of photonic integrated circuits on wafer level

EPIC Online Technology Meeting on Photonics Packaging and Testing

24.04.2020, Tobias Gnausch

Application and Market requirements

The developed solution is an **ultra-fast opto-electronic probe card,** so called '**UFO Probe**', for high-volume wafer level test of **photonic integrated circuits (PIC)** for optical transceivers.

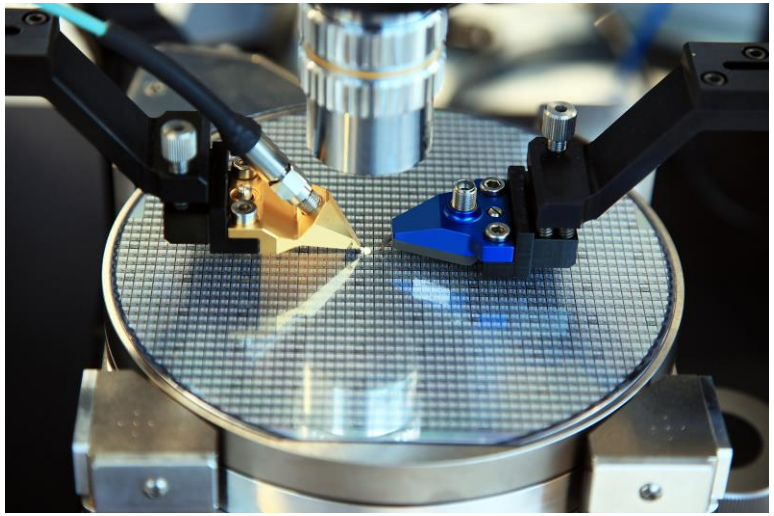


/1/ Photonic integrated circuit

Since the PIC ecosystem is still under development, it needs to

- align with CMOS fabrication chain,
- meet current industry standards,
- reduce costs!

→ Opto-electronical testing plays a vital role!

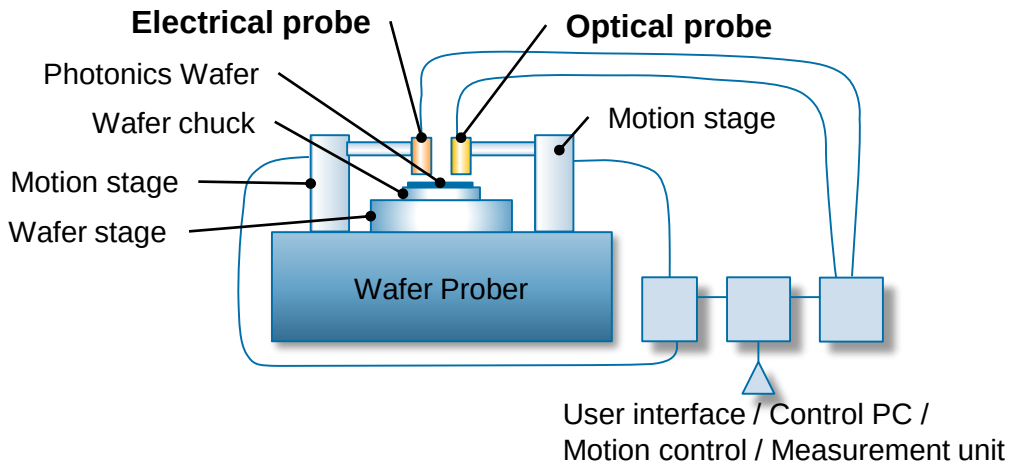


/1/ InP PIC; courtesy of TU/e

Current and Ideal Wafer Level Test Solutions

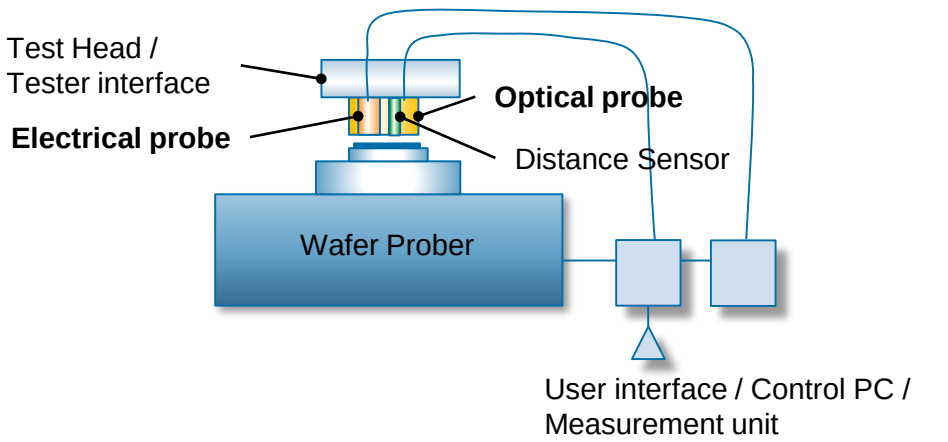
Current commercially available solutions

- are **fiber based,**
- need **active alignment** in **sub-micrometer** range,
- **separated probes** (electrical and optical) and
- **dedicated** or customized probing **equipment.**
- Have **no** or only limited possibility for **parallelization.**



Ideal solution

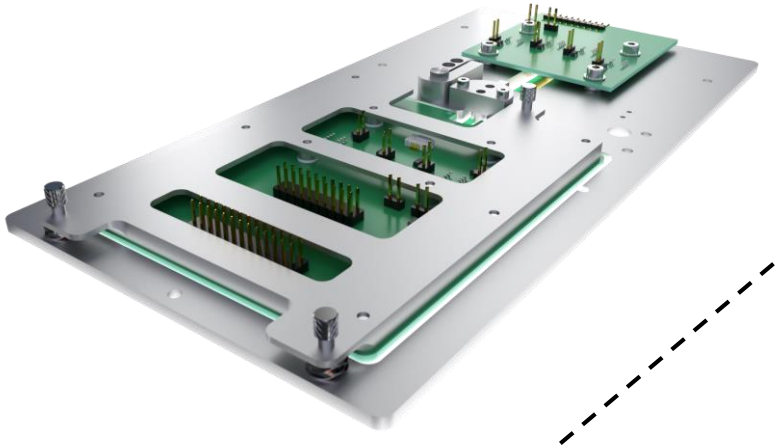
- would be **Plug & Play' ready** for existing **standard IC wafer probers** and automated test equipment,
- needs **no active alignment** time per chip,
- **Parallel qualification** → multi-DUT regime
- Can be operated by same personnel as standard IC equipment → no advanced training needed.

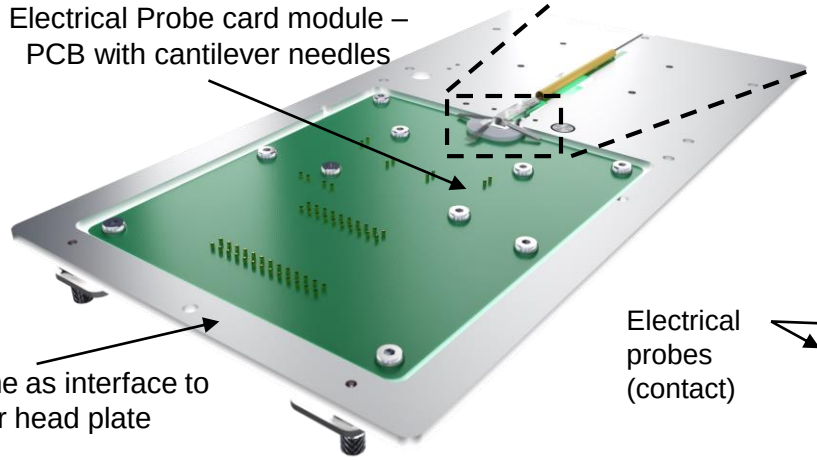


UFO Probe - First Technical Demonstrator

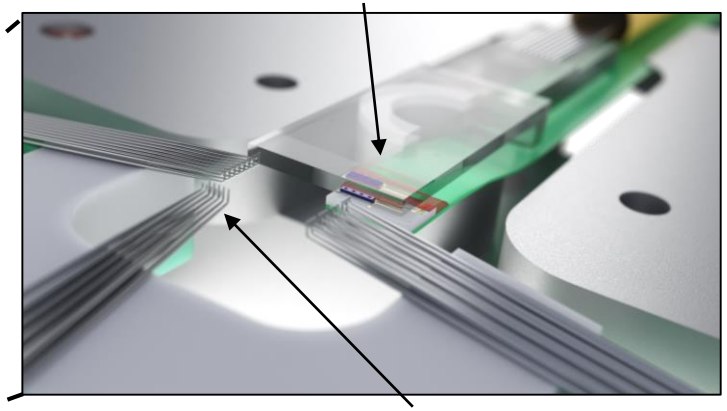
Prototype with

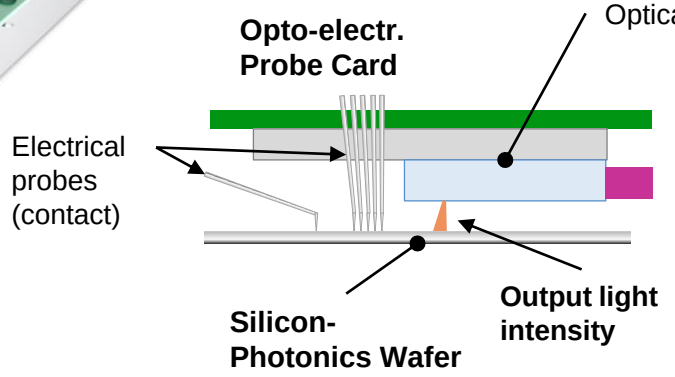
- Standard prober interface (Eurocard format)
- **Monolithic optical module:**
  - 16 optical I/O’s
  - Works for PICs with **grating couplers**
  - Alignment insensitive optical coupling
- Simultaneous optical and electrical probing

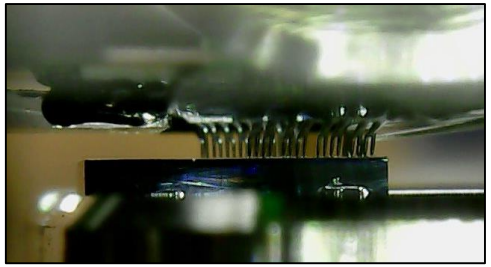




Optical module
with passive optical circuitry for multiple optical I/O’s







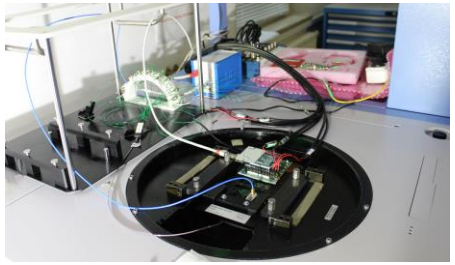
Measurement of a PIC as single-die

Summary: UFO Probe - What did we achieve?

– Developed a scalable optical solution and realized fully integrated probe card

– Demonstrated **wafer level capability** and **compatibility to standard prober** tolerance

- on an Accretech UF200R (@ htt / IS-Test)
- on an Accretech UF3000 (@ RoodMicrotec)



– **Establishing a commercially available manufacturing chain** for opto-electronical probe cards with partners

- Cooperate with probe card manufacturer, e.g. htt GmbH → htt
- Support customer roadmaps, e.g. RoodMicrotec (test house) → RoodMicrotec

– Next: Platform development → adapt for other needle technologies/ other applications

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